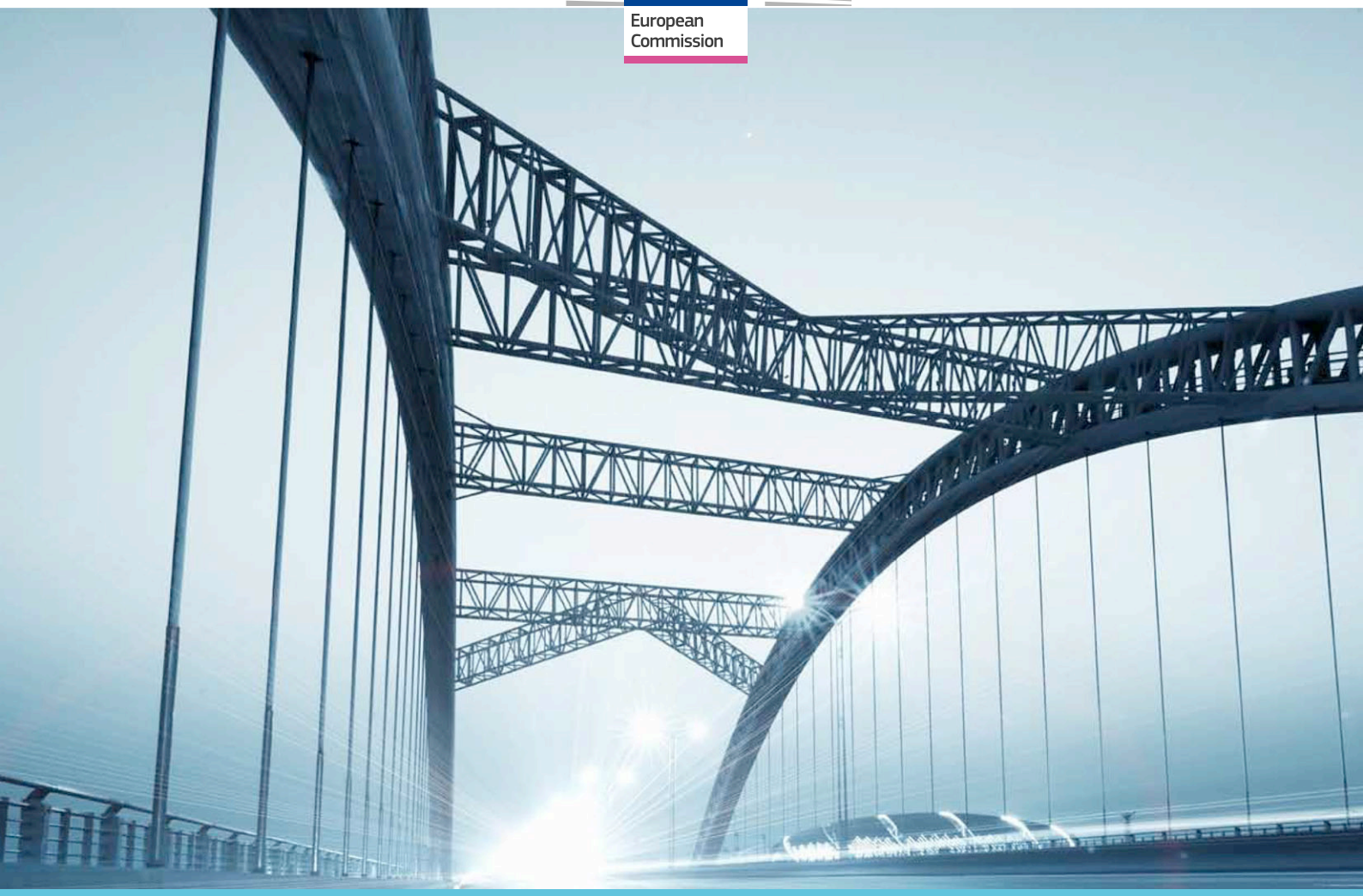
European Commission



ESIC European Service Innovation Centre

DISCUSSION PAPER

Service Innovation and Economic Performance

Andrea Zenker (Fraunhofer ISI)

Emmanuel Muller (Strasbourg Conseil)

Hugo Hollanders (MERIT)

January 2015

ESIC in Brief

Increasingly service innovation plays an instrumental role in the transformation and upgrading of traditional economic sectors and industries into more productive, competitive and high value-added business eco-systems. Considered as being multi-dimensional in nature, service innovation comprises innovation in services, service sectors or service industries that are provided by service entrepreneurs and service firms. It also takes place in manufacturing industries, adding further value and contributing significantly to overall productivity and profitability. There is a growing need to assess, analyse and demonstrate what impact service innovation has on industrial change and to assist Member States and regions towards a greater understanding of service innovation as a driver of industrial transformation and future competitiveness.

The European Service Innovation Centre (ESIC) is a two-year initiative commissioned by the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs to capture and demonstrate the dynamics and large-scale impact of service innovation, as well as to assess how service innovation impacts on competitiveness, industrial structures and regional development. It also focuses on assessing the implications and impacts of service innovation on employment structures, economic patterns and value creation.

ESIC has prepared a European Service Innovation Scoreboard (ESIS) in order to capture and demonstrate the impact of the **'transformative power'** of service innovation. This paper presents selected analyses based on ESIS and discusses the topic of service innovation and economic performance in the EU's regions.

In addition, ESIC has provided customised advice to six selected model demonstrator regions (the Canary Islands, Emilia-Romagna, Limburg, Luxembourg, Northern Ireland and Upper Austria). However, the initiative will also help Europe's other regions and Member States to make better use of the transformative power of service innovation in strengthening existing and emerging industries and markets and in developing better industrial policies and smart specialisation and cluster strategies. The goal of creating a favourable eco-system for service innovation will boost supportive infrastructures and business conditions that, in turn, will facilitate the take-up of innovative services throughout the economy.

The European Service Innovation Scoreboard, the Summary Assessment Reports and Policy Briefs from all six Model Demonstrator Regions are available on the ESIC website at: http://ec.europa.eu/enterprise/initiatives/esic/index_en.htm

This work is a part of a service contract for Internal Market, Industry, Entrepreneurship and SMEs Directorate-General of the European Commission.

Table of Contents

Figures

Tables

1. Main Results

Produced by the European Service Innovation Centre (ESIC), this paper focuses on service innovation-related characteristics of European regions in relation to their economic performance. It uses data from the European Service Innovation Scoreboard (ESIS).

The analyses show different characteristics for Europe with respect to economic performance and service innovation. Economic performance tends to be higher in regions with higher input in service innovation, while the translation of service innovation inputs into throughputs and measurable impacts differs between regions. Generally, higher levels of economic performance are achieved in more favourable framework conditions and a comparatively high specialisation in knowledge-intensive services. The analyses lead to conclude that service innovation is not the only source for economic performance, but that non-negligible effects can be expected from a focus on service innovation, particularly in regions with below-average economic performance.

2. Methodological and Data Background

Over the past decades, the importance of innovation activities in the service sector has been widely acknowledged in innovation research and policies. The Expert Panel on Service Innovation in the EU discussed that service innovation contributes to economic transformations and structural change in European Member States and regions (Expert Panel on Service Innovation in the EU 2011). One of the Panel's recommendations was to establish the European Service Innovation Centre (ESIC), see http://ec.europa.eu/enterprise/initiatives/esic/index_en.htm.

ESIC's aim is to analyse service innovation at the level of European regions and to develop policy tools to support service innovation and its capacity to contribute to industrial transformation and structural change.

In this context, ESIC developed the European Service Innovation Scoreboard or ESIS[1] that is based on a methodological model (Hollanders et al. 2014a). It relates to different facets of service innovation and produces scorecards for European NUTS 2[2] regions using a broad range of indicators.[3] The first pilot version was published in June 2014 and the updated version was published in January 2015. This paper uses the most recent data from a selection of indicators from the updated ESIS to discuss the aspects of service innovation and economic performance in European regions, and specifically addresses the question of how service innovation in EU regions relates to key statistical information.

---

[1] See http://ec.europa.eu/enterprise/initiatives/esic/scoreboard/index_en.htm

[2] The NUTS classification (Nomenclature des unités territoriales statistiques or Nomenclature of territorial units for statistics) refers to a system of economic territories of the European Union, leading to NUTS regions in different hierarchies. This system is used across Europe for the purpose of producing regional statistics, for socio-economic analyses and is the territorial reference for regional policies. Currently, the NUTS classification displays 272 regions at NUTS 2 level (see also http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction). ESIS 2015 also includes Serbia, Iceland, Norwegian regions, Switzerland, the former Yugoslav Republic of Macedonia and Turkey

[3] These regional scorecards are available at: http://ec.europa.eu/enterprise/initiatives/esic/scoreboard/regional-scorecards/index_en.htm

3. Overview: Economic Performance and Service Innovation in European Regions

3.1. Great degree of variety among European regions

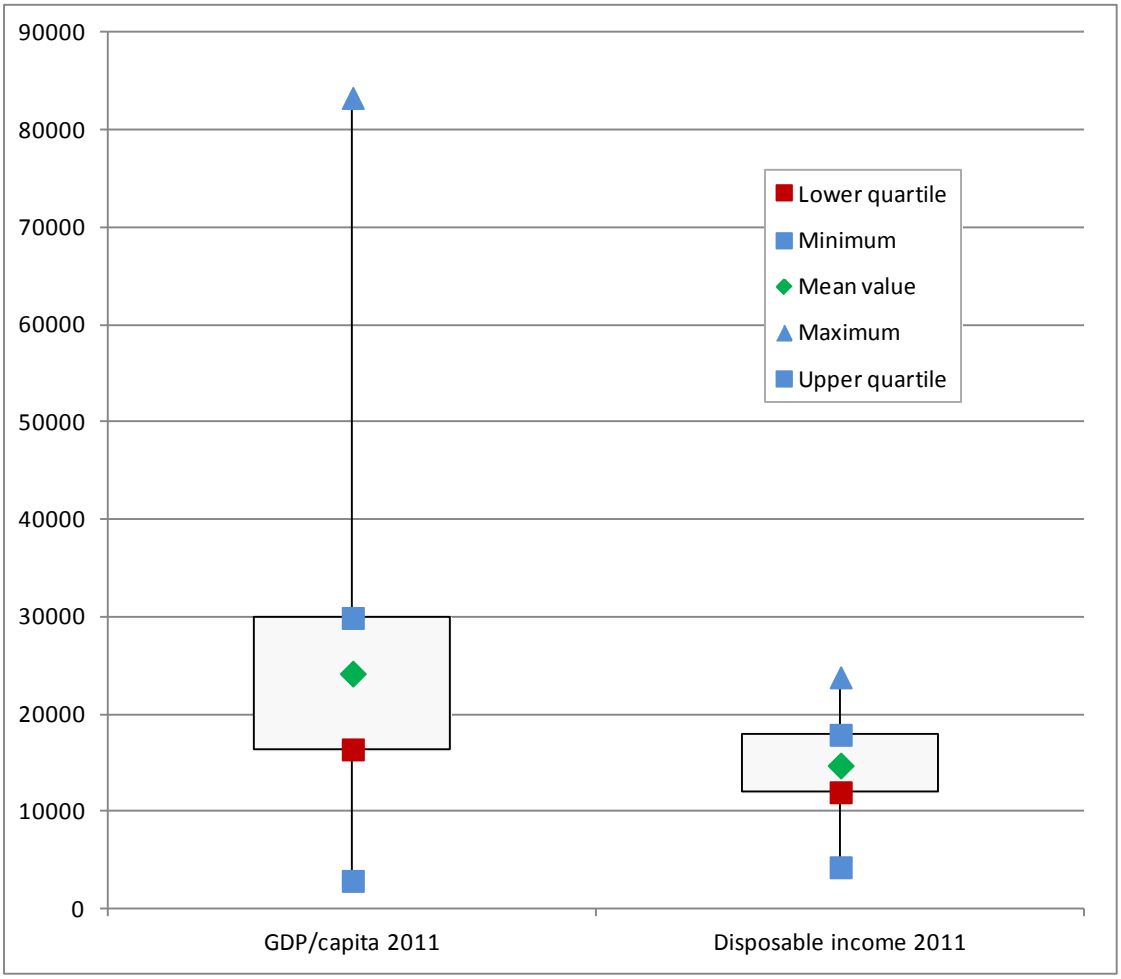
The European Service Innovation Scoreboard provides statistical profiles for 287 European regions at NUTS 2 level. Backed by a methodological model, it uses a broad range of indicators that are assigned to different dimensions of the (service) innovation process (Hollanders et al. 2014a). For each of the regions, a 'scorecard' presents regional performance for each of the indicators that is compared with the performance of the EU-27. In addition to the service innovation scorecard, economic performance indicators and structural indicators complement the regional pictures.

The following sections aim to investigate European NUTS 2 regions' economic performance and their service innovation characteristics, using ESIS data for analysis. Former analyses (Hollanders et al. 2014b) have shown that service innovation contributes to the innovation performance of European Member States, while at regional level, linking service innovation and innovation performance, as measured in the Regional Innovation Scoreboard[4], is more complex, partly due to the variation between European regions.

Figure 1 compares the figures for gross domestic product (GDP) per capita and disposable income 2011 (Euro) for the European regions included in ESIS. It shows the large variety across Europe, particularly with respect to GDP per capita. This indicator reveals a range between € 2,900 (the Bulgarian region of Severozapaden) and € 83,300 (Inner London), while the disposable income in 2011 ranges between € 4,300 (the Romanian region Nord-Est) and € 23,800 (Luxembourg). This means that the spread of GDP per capita (€ 80,400) is more than four times as high as that for disposable income (€ 19,500). Since real disposable income may be the result of reallocation mechanisms, GDP may be considered as a more appropriate indicator for measuring economic performance.

[4] The Regional Innovation Scoreboard helps to understand innovation in the regional context and provides statistical facts on regions' innovation performance. It follows the measurement framework of the Innovation Union Scoreboard and is published once every 2 years:
http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/

Figure 1: Basic characteristics of GDP/capita and disposable income in European regions



Source: European Service Innovation Scoreboard 2015 (data based on Eurostat)

3.2. Differences in performance in the dimensions of the European Service Innovation Scoreboard (ESIS)

Table 1 presents service innovation related characteristics of the regions included in ESIS. It is based on the five dimensions of the European Service Innovation Scoreboard and additionally includes an indicator on regional specialisation in knowledge-intensive services (KIS).[5] The figures for all six indicators and dimensions indicate a comparatively large variation within Europe, represented in the differences between minimum and maximum values. Undoubtedly, some European regions are less focused on services, while others have high scores in the considered service innovation characteristics (cf. Table 1).

[5] This location quotient refers to the regions' specialisation in knowledge-intensive services (KIS) in relation to the EU, measured in terms of employment. Values below 1.0 indicate a comparatively lower specialisation while above-average specialisation in KIS is represented through values higher than 1.0

Table 1: Service innovation characteristics across European regions

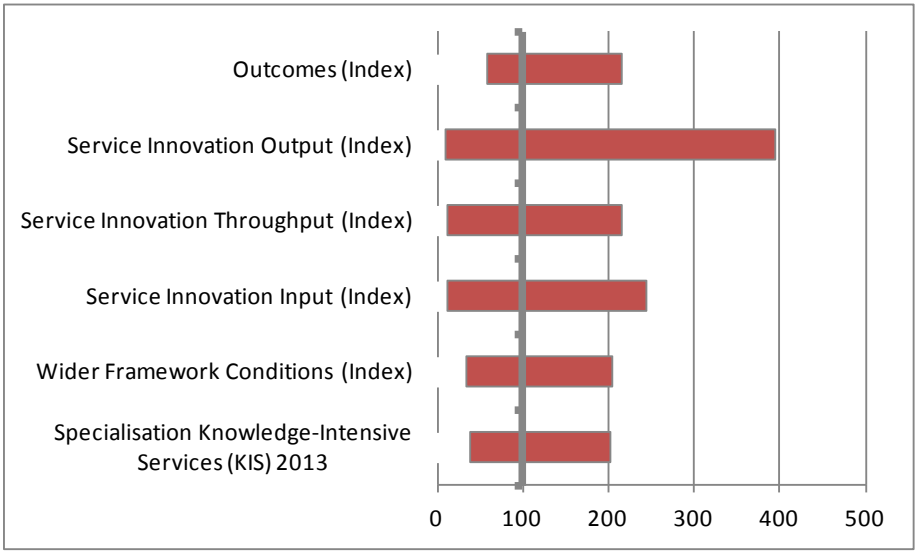
Characteristics	*Specialisation Knowledge-Intensive Services (KIS) 2013*	Wider Framework Conditions (Index)	Service Innovation Input (Index)	Service Innovation Throughput (Index)	Service Innovation Output (Index)	Outcomes (Index)
Minimum	*0.39*	15.2	4.0	4.7	2.7	29.5
Maximum	*1.64*	76.8	72.4	77.6	96.4	78.1
Range	*1.25*	61.6	68.4	72.9	93.7	48.6
Mean value	*1.00*	45.0	31.4	38.0	25.1	50.0
EU-27	***1.00***	**43.7**	**32.7**	**37.9**	**27.5**	**50.8**
Standard deviation[6]	*0.22*	14.70	12.83	17.05	10.19	5.97

Source: European Service Innovation Scoreboard 2015 (Data based on Eurostat (R&D Statistics, Community Innovation Survey, Structural Business Statistics, Labour Force Survey), Regional Competitiveness Index 2010 (Annoni/Kozovska 2010), European Values Survey, and ESIC data calculations)

Note: The number of considered regions varies between 278 and 287 depending on data availability

This finding is emphasised by Figure 2 that illustrates the difference between minimum and maximum scores (indexed to the average) across all regions. It shows that highest differences in performance are displayed in service innovation output, followed by service innovation input.

Figure 2: Differences in performance in European regions



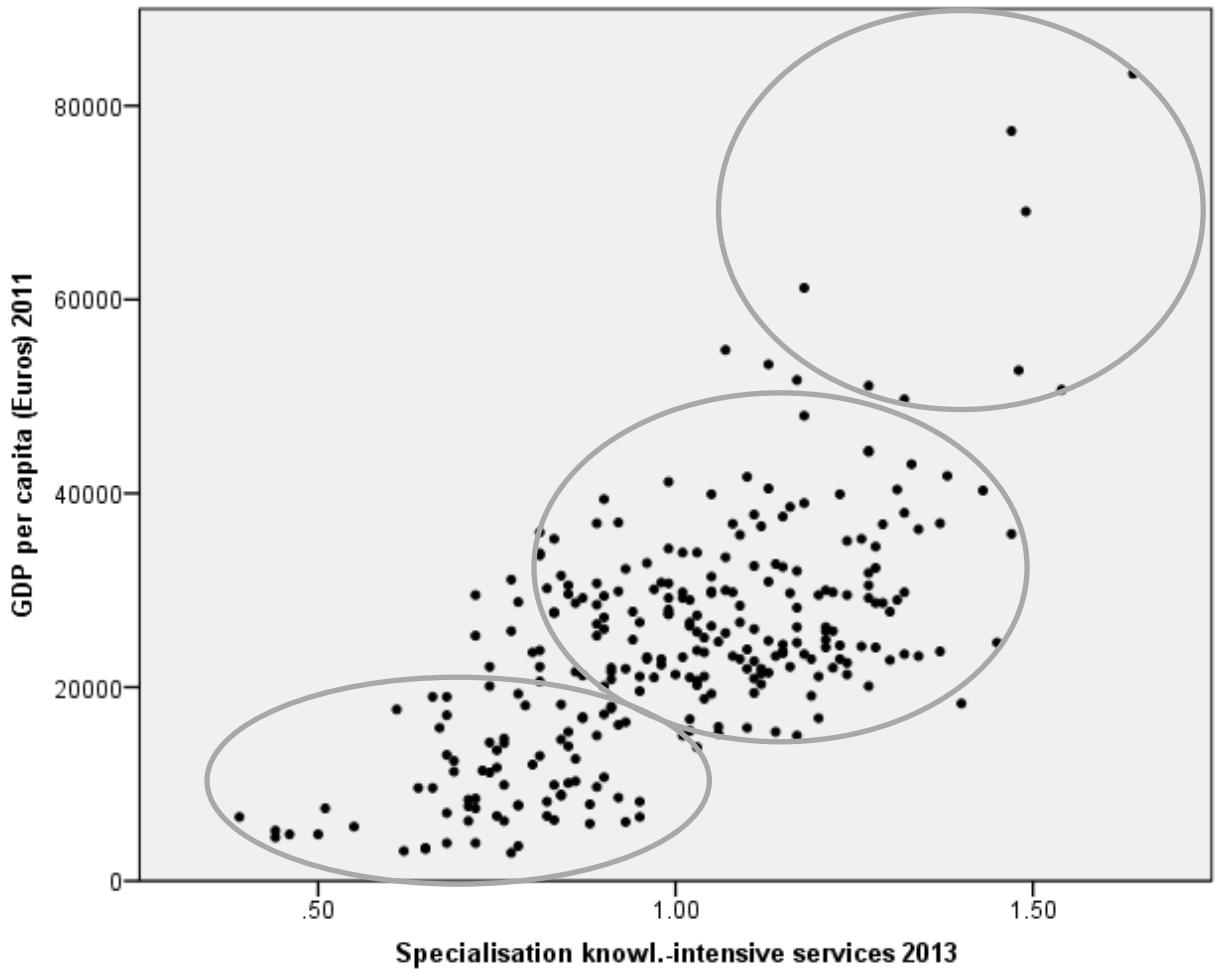
Source: European Service Innovation Scoreboard 2015 (data based on Eurostat)

[6] The standard deviation measures the degree of variation from the average

3.3. Positive relation of specialisation in knowledge-intensive services, wider framework conditions and economic performance

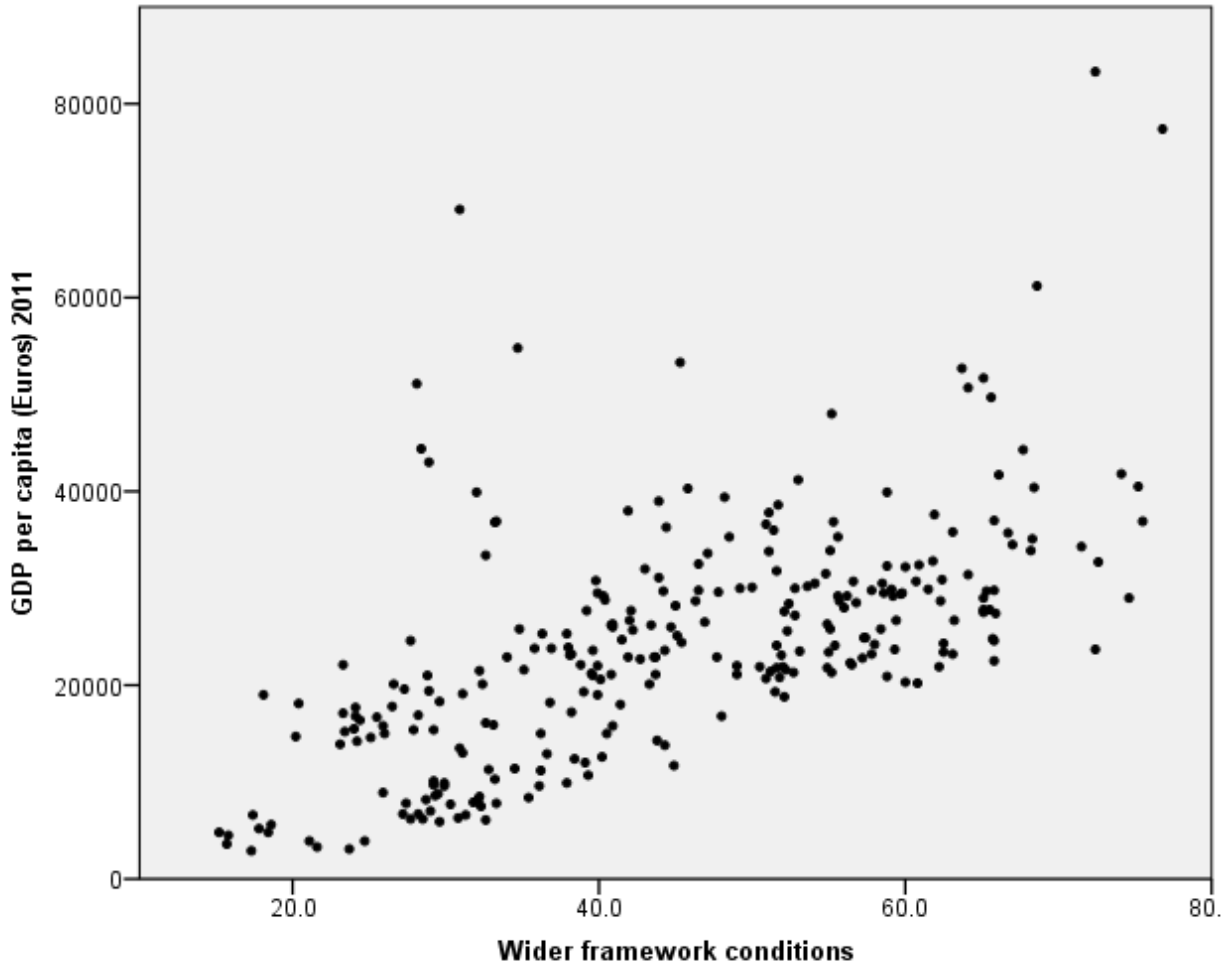
The following section reviews the relationship between economic performance and service characteristics across Europe, using GDP per capita as indicator for economic performance. A first overview of service characteristics and economic performance is given in Figure 3 that maps the specialisation in knowledge-intensive services (KIS) and GDP per capita in European regions. It becomes obvious that these indicators tend to follow a positive trend, with a group of regions presenting below-average (i.e. < 1) specialisation in knowledge-intensive services and a GDP per capita below about € 20,000, a larger group of regions with KIS specialisation between about 0.8 and 1.5 and GDP per capita between about € 20,000 and € 50,000, and a final small group of regions with higher specialisation in knowledge-intensive services and/or higher GDP per capita figures. Economic performance and wider framework conditions also indicate a positive relationship, see Figure 4.

Figure 3: Economic performance and specialisation in knowledge-intensive services in European regions



Data source: European Service Innovation Scoreboard 2015

Figure 4: Economic performance and wider framework conditions in European regions

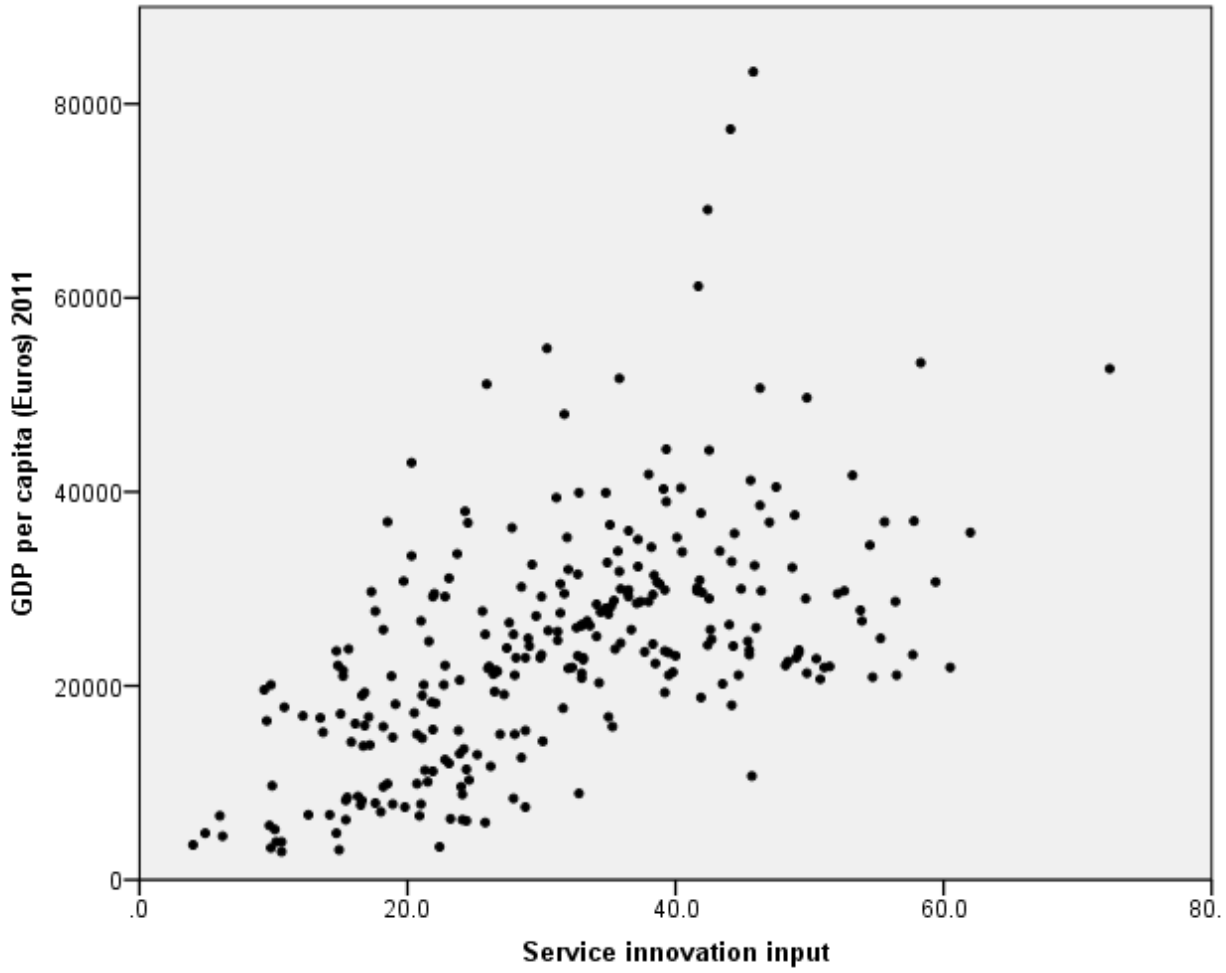


Data source: European Service Innovation Scoreboard 2015

3.4. Positive relation of service innovation input, throughput, output and economic performance, but variation in regions with higher GDP per capita

Considering input into service innovation, which is the deliberate development of service innovation according to the methodological model developed by the European Service Innovation Centre (Hollanders et al. 2014a) and economic performance also indicates positive associations in a broader sense, though with a certain dispersion (see Figure 5). Variation in economic performance seems to increase amongst regions with higher service innovation input. The European regions with the highest economic performance figures do not necessarily display the highest engagement in service innovation, but modest GDP per capita figures are generally related to moderate service innovation inputs.

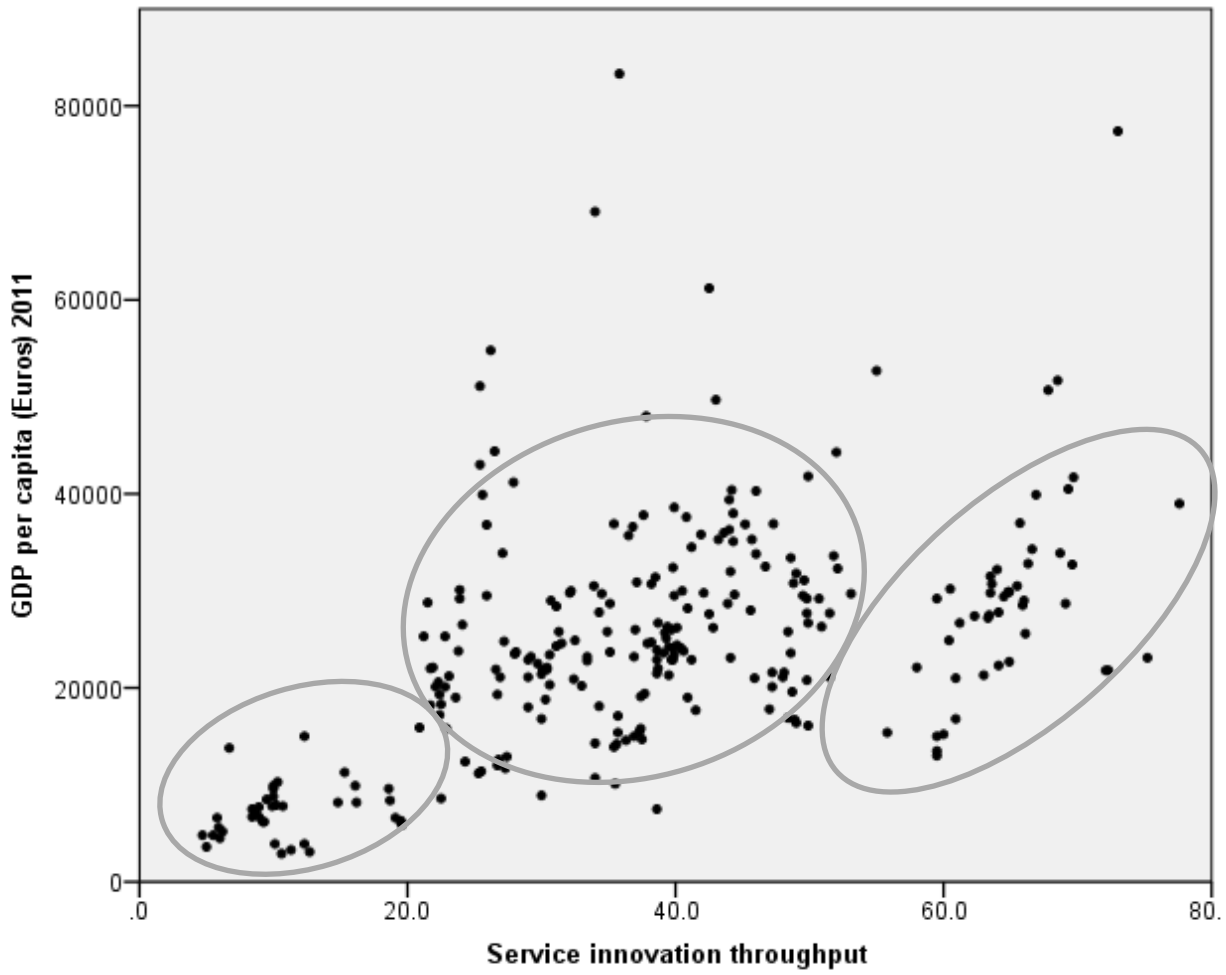
Figure 5: Economic performance and service innovation input into European regions



Data source: European Service Innovation Scoreboard 2015

When service innovation throughput is related to economic performance, the picture becomes more blurred (Figure 6), though with a positive general trend between both indicators. There is a group of regions with modest scores for service innovation throughput and modest economic performance, a large group of regions covering service innovation throughputs between about 20 and 55 and a third group of regions with throughput between about 55 and 80 and different levels of economic performance. Regions with high GDP per capita figure have different levels of service innovation throughput, as indicated in the upper part of the figure.

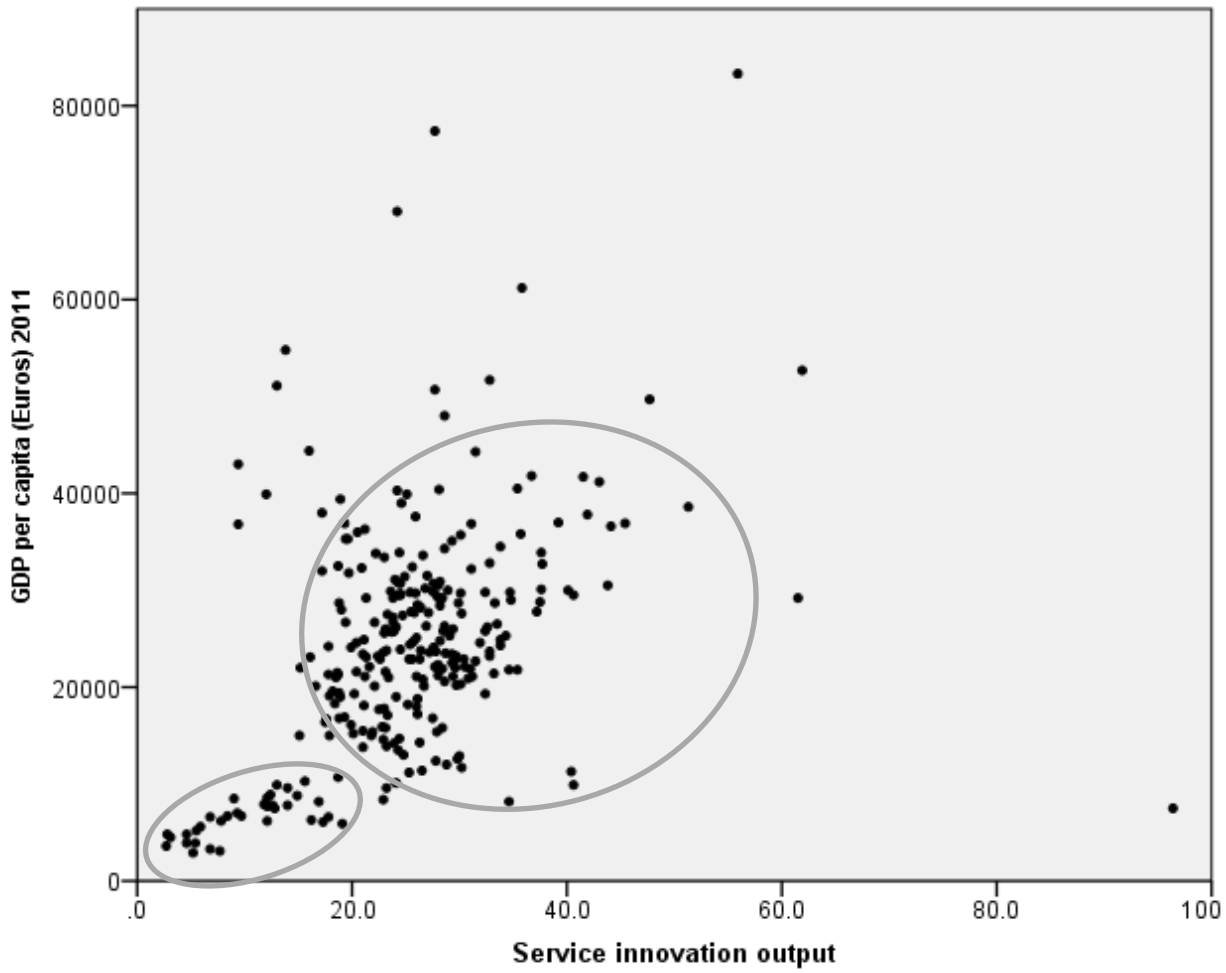
Figure 6: Economic performance and service innovation throughput in European regions



Data source: European Service Innovation Scoreboard 2015

The relations between economic performance and service innovation output also follow a positive trend, as shown in Figure 7. In addition to a group of regions with moderate GDP per capita and service innovation output below 20.0, this figure points to a large group of regions with output scores between about 20.0 and 55.0. Service innovation output and economic performance scores are positively related. Figure 7 also illustrates some regions with comparatively high economic performance and modest service innovation output scores. On the other hand, Turkey achieves a score of 96.4 on the output dimension which is related to moderate economic performance. The high output figure results from non-available data for employment in service innovation intensive industries on the one hand and from very high values both in turnover of newly introduced innovations new to the market and new to the firm on the other hand.

Figure 7: Economic performance and service innovation output in European regions

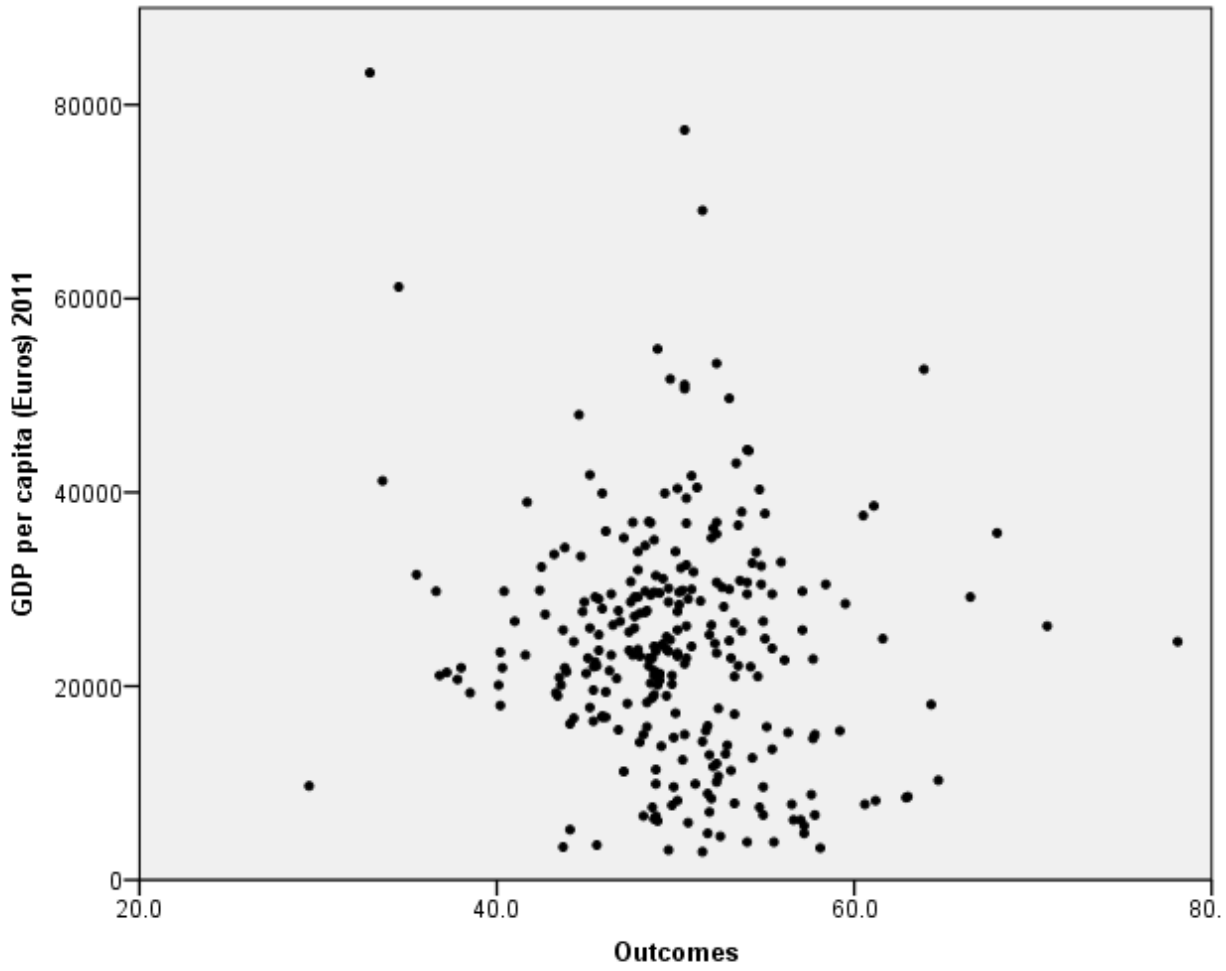


Data source: European Service Innovation Scoreboard 2014

3.5. A less clear relation between service innovation outcomes and economic performance

Figure 8 shows the outcomes as defined in the ESIC methodological model[7] and economic performance measured as GDP per capita in European regions. It becomes obvious that GDP per capita and outcomes do not prove to be directly linked, at least not in a simple, linear way. Regions with highest outcome figures show rather average GDP per capita figures, while at the other end of the spectrum, regions with the highest economic performance tend to have not extremely high outcome figures. Outcomes are based on dynamic variables measuring the growth of employment shares and productivity within a certain time span. Higher growth can more easily be achieved when starting on lower levels so that economically strong European regions do not necessarily witness high outcomes results (see also Hollanders et al. 2014b).

Figure 8: Economic performance and outcomes in European regions



Data source: European Service Innovation Scoreboard 2015

[7] Outcomes are composed of: Change in employment share in service fields with transformative power, in knowledge-intensive services, and in medium-high and high-tech manufacturing as well as labour productivity growth, cf. Hollanders et al. (2014a)

3.6. Summary: Variability of service innovation and economic performance across Europe, but distinguishable trends

In summary, there are considerable variations across European regions in terms of both the characteristics of economic performance and service innovation. The following trends can be distinguished:

Firstly, higher economic performance by a region tends to be related to increasing specialisation in knowledge-intensive services compared to the EU average.

Secondly, a positive trend between wider framework conditions and economic performance can be observed: European regions with higher scores on GDP per capita tend to also score higher on wider framework conditions and vice versa.

Finally, GDP per capita and service innovation characteristics as presented in five ESIS dimensions tend to show increasing levels of dispersion. While GDP per capita and service innovation input as well as GDP per capita and service innovation output follow a positive trend, in throughput, different groups of regions according to their throughput levels are visible. Outcomes vary with economic performance measured in terms of GDP per capita. Thus, the general conclusion, which can be drawn, is that economic performance seems to be related to specialisation in knowledge-intensive service and wider framework conditions, service innovation input, throughput and output, while outcomes patterns vary and do not show an unambiguous trend.

4. Service Innovation and Economic Performance in European Regions: A differentiated Picture

A deeper understanding of the relationships between the relevant indicators can be facilitated by correlation analyses.[8] Table 2 shows that there are positive and very significant (on the 0.01 level) correlations of GDP per capita with all the other indicators except outcomes. The highest figures are obtained for the correlation between service innovation input and wider framework conditions (0.784), GDP/capita and wider framework conditions (0.676), wider framework conditions and service innovation output (0.634), as well as specialisation in knowledge-intensive services and service innovation input (0.618). This particularly indicates a positive relation of the wider framework conditions on service innovation input and output and economic performance.

Table 2: Results of the rank correlation analysis (Spearman) for European regions

	GDP/cap.	Spec. KIS	Wider Framew. Cond.	Service innovation Input	Service innovation Through-put	Service innovation output	Out-comes
GDP/cap.	1.0						
Spec. KIS	0.607	1.0					
Wider Framew. Cond.	0.676	0.578	1.0				
Service innov. input	0.606	0.618	0.784	1.0			
Service innov. Through-put	0.562	0.260	0.441	0.317	1.0		
Service innov. output	0.442	0.336	0.634	0.598	0.255	1.0	
Out-comes	-0.084	-0.076	-0.153	-0.088	-0.171	-0.086	1.0

Data base: ESIS 2015

Dark grey: significant two-sided correlations coefficient (Spearman) at the 0.01 level.
Light grey: significant two-sided correlations coefficient (Spearman) on the 0.05 level

Looking into more detail in the wider framework conditions reveals strongly significant correlations of institutions (0.688), macroeconomic stability (0.302), infrastructure (0.591), higher education and training (0.643), labour market efficiency (0.633), market size (0.701) and business sophistication (0.681) with GDP per capita. Further, the share of people who think it is important to have new ideas and to be creative is positively related to GDP per capita, but on a lower level of significance (0.05).

[8] Since the data set used does not follow a normal distribution, Spearman's rank correlation coefficient (two-tailed significance) was used for the correlation analyses presented in the following section

Further positive and significant correlations are between economic performance, specialisation in knowledge-intensive services and service innovation input. This shows that European regions with higher scores in economic performance tend to have higher specialisations in knowledge-intensive services and disclose higher input in service innovation. Table 2 also shows positive and significant correlations between service innovation input and throughput, as well as between service innovation throughput and output and also between service innovation input and output. This shows that the dimensions of the service innovation process as defined in the methodological model are positively related.

5. Policy implications

This discussion paper is based on the results of specific analyses related to service innovation characteristics for European regions deriving from the European Service Innovation Scoreboard (ESIS). It focuses on the dimensions defined in the frame of the ESIS investigations (cf. Box 1).

Box 1: Dimensions of the analysis

Following the ESIS methodology, the dimensions of the analysis are related to:

- wider framework conditions;
- service innovation input;
- service innovation throughput;
- service innovation output;
- service innovation outcomes;
- regional GDP per capita (as an indicator for economic performance); and
- specialisation in knowledge-intensive services (as a descriptor for regional service characteristics).

The first part of the analysis pointed up positive associations between economic performance, KIS specialisation, service innovation input and wider framework conditions but also referenced positive relations of GDP per capita with service innovation throughput and output.

The second part of the examination consisted of a correlation analysis allowing a better understanding in terms of relationships between the considered indicators. Some core findings are resulting from the performed statistical analyses (cf. Box 2).

Box 2: Core findings of the analysis

- Despite the variety of economic performance in European regions, future analyses (such as statistical cluster analyses) could lead to common types of 'service innovators' pooling different regions (independently from their belonging to Member States);
- The analysis might indicate different models of service innovation in Europe with specific characteristics and behaviours;
- In terms of general conclusions, the most coherent service innovation model seems to be relevant to regions with lower GDP per capita figures, while more wealthy regions are more heterogeneous in respect to their service innovation characteristics. In such cases, it can be postulated that their high GDP per capita figures are not only related to service innovation, but also to their more divergent modes of innovation.

The core results of the analysis concern some the positive correlations that may be of primary importance for future policy making efforts (cf. Box 3).

Box 3: Correlations of primary importance for future policy developments

The most crucial positive linkages resulting from the analysis are to be found between:

- Economic performance

and

- Wider framework conditions;
- Specialization in knowledge-intensive service in all regions;
- Service innovation input.

As a consequence of the analysis in this paper it can be stated that: (i) economic performance seems to be particularly high in European regions with positive framework conditions for (service) innovation and a focus on knowledge-intensive services; (ii) a broad spectrum of factors supporting service innovation seem to have positive effects in terms of regional ability to support service innovations and (iii) a strong heterogeneity in terms of service innovation models at regional level must be considered across Europe.

Finally, in terms of policy implications, the following three core recommendations can be formulated.

First of all, no general and undifferentiated policy should be expected and/or performed at regional level within the EU regarding the support of service innovation capacities. In other words, due to the observed heterogeneity in terms of starting or existing economic pre-conditions, service innovation-related policies must clearly be tailored. In this respect, the paper 'Lessons from the Model Demonstrator Regions: Service Innovation Policy in Practice'[9] synthesises key findings from the six ESIC model demonstrator regions.

A second recommendation deals with the specific case of "less advanced regions" since they display the highest potential in terms of transformative power of services innovation at regional level. On the contrary, regions already benefiting from better starting conditions may not see their propensity to benefit from additional efforts to significantly reinforce the economic impact of their service innovation performance. In other words, due to threshold effects expectations related to service innovation-related policies in terms of transformation of regional economies must necessarily be modulated.

Last, a final recommendation relates to the complementary character of national and regional development policies and EU-wide service innovation related policies based on the hypothesis of the existence of a regional transformative power. In fact the first are not necessarily strongly innovation-based and are mostly oriented toward manufacturing activities. Innovating service industries may be considered as strategic targets for policy making (e.g. ICT or creative industries) nevertheless the transformative power of service innovation is mostly neglected even if part of it is taking place in manufacturing firms.

Beyond these three recommendations, the main policy issue of the exercise was to determine in how far the hypothesis can be validated that service innovation may constitute a factor strongly impacting directly and positively regional economic growth and to a further extent societal well-being.

[9] See http://ec.europa.eu/enterprise/initiatives/esic/materials/conference/esic_synthesis_wp2_edited.pdf

The results of the statistical analysis do not reject this hypothesis. Nevertheless, those results cannot provide an undifferentiated positive answer. In fact, the impact of service innovations at regional scale may vary strongly from one region to the other. What can be stated is that “less advanced regions” display the highest potential in terms of transformative power of service innovation at regional level. The impact of the transformative power of service innovation in the case of regions already benefiting from better starting conditions may be weaker.

More generally, and as a conclusion related to the transformative power of service innovation a crucial aspect determining its policy relevance must be kept in mind. In fact, the phenomenon of transformative power cannot be understood as a simple causal one-directional relationship. It may be influenced by strong time-lag effects that should not be underestimated. Furthermore, transformative power of service innovations should be seen as a non-linear “intra-regional infusing” impact (hypothetically positive) depending from differentiated regional starting conditions.

References:

Annoni, P./Kozovska, K. (2010): *EU Regional Competitiveness Index 2010*, EUR 24346 EN - 2010, JRC Scientific and Technical Reports. Luxembourg: JRC European Commission, Institute for the Protection and Security of the Citizen.

Expert Panel on Service Innovation in the EU (2011): Meeting the Challenge of Europe 2020. The Transformative Power of Service Innovation. Online: http://www.europe-innova.eu/web/guest/innovation-in-services/expert-panel/publications (accessed: 28.02.2012).

Hollanders, H./Buligescu, B./Es-Sadki, N./Foldspang, L./Lange, P./MacAulay, B./Muller, E./Zenker, A. (2014a): *Methodology for measuring the transformative power of service innovation - European Service Innovation Scoreboard (ESIS)*: European Commission, Directorate-General Enterprise and Industry.

Hollanders, H./Es-Sadki, N./MacAulay, B./Muller, E./Zenker, A. (2014b): *European Service Innovation Scoreboard (ESIS) - Key findings. ESIC European Service Innovation Centre Report*.